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PATENT

IN THE CLAIMS

1. (Amended) A computer-assisted method for determining a dimension of an anatomical feature using two or more fluoroscopic images, the method comprising:

displaying a first fluoroscopic image taken of an anatomical feature taken from a first pose, the first image being registered to a common three-dimensional coordinate system;

receiving indication of position of at least a first point and a second point within first image corresponding respectively to at least two anatomical landmarks shown within first image;

displaying a second fluoroscopic image taken of the anatomical feature from a second angle, the second image being registered to the known three-dimensional coordinate system;

indicating with reference to the second image where the anatomical landmarks lie along each of two lines of sight ~~defined by~~, each line of site extending between an x-ray source and an x-ray detector of a fluoroscope taking the first image and through a different one of the first and second points within the three-dimensional coordinate system; and

determining distance of a line specified by the first and second points.

2. (Original) The method of claim 1, further comprising:

placing within the field of view of each fluoroscopic image a plurality of fiducials having known positions with respect to each other;

receiving an input to identify two-dimensional coordinates of each of the plurality of fiducials displayed on each of the images; and

registering the images by creating a geometric model having parameters, said model projecting three-dimensional coordinates of the plurality of fiducials into the identified coordinates of the fiducials on the images, and numerically optimizing the parameters of the geometric model such that the projections of the known three-dimensional coordinates of the fiducials best fit the identified two-dimensional coordinates in each of the images.

3. (Original) The method of claim 1 wherein the lines of site are indicated on the second image by lines drawn on the second image.

4. (Amended) An apparatus for determining a dimension of an anatomical feature using two or more fluoroscopic images, comprising:

means for displaying a first fluoroscopic image taken of an anatomical feature taken from a first pose, the first image being registered to a common three-dimensional coordinate system;

means for receiving indication of position of at least a first point and a second point within first image corresponding respectively to at least two anatomical landmarks shown within first image;

means for displaying a second fluoroscopic image taken of the anatomical feature from a second angle, the second image being registered to the known three-dimensional coordinate system;

means for indicating with reference to the second image where the anatomical landmarks lie along each of two lines of sight ~~defined by~~ each line of site extending between an x-ray source and an x-ray detector of a fluoroscope taking the first image and through a different one of the first and second points within the three-dimensional coordinate system; and

means for determining distance of a line specified by the first and second points.

5. (Amended) A computer readable storage medium on which is recorded program instructions that, when read and executed by a computer, cause the computer to undertake the following steps:

displaying a first fluoroscopic image taken of an anatomical feature taken from a first pose, the first image being registered to a common three-dimensional coordinate system;

receiving indication of position of at least a first point and a second point within first image corresponding respectively to at least two anatomical landmarks shown within first image;

displaying a second fluoroscopic image taken of the anatomical feature from a second angle, the second image being registered to the known three-dimensional coordinate system;

indicating with reference to the second image where the anatomical landmarks lie along each of two lines of sight ~~defined by~~, each line of site extending between an x-ray source and an x-ray detector of a fluoroscope taking the first image and through a different one of the first and second points within the three-dimensional coordinate system; and

determining distance of a line specified by the first and second points.

6. –10. (cancelled)

11. (New) A computer-assisted method for determining a dimension of an anatomical feature, the method comprising:

displaying a first fluoroscopic image taken of an anatomical feature of interest from a first angle and a second fluoroscopic image taken from a second angle of the anatomical feature of interest, the first and second images being registered with respect to a common three-dimensional coordinate system;

defining in the three-dimensional coordinate system an object by receiving indications of the position of the object with respect to the first and second fluoroscopic images;

displaying in the first and second fluoroscopic images graphical representations of the object projected into the first and second fluoroscopic images; and

measuring a dimension of the object.

12. (New) The method of claim 11 further comprising automatically updating the positions of the graphical representations of the object projected into the first and second fluoroscopic images based on a change in the position of the object.

13. (New) The method of claim 11 further comprising automatically updating the graphical representations of the object projected into the first and second fluoroscopic images based on a change to a parameter of the object.

14. (New) The method of claim 11, wherein the object is comprised of at least two points.

15. (New) The method of claim 11, wherein the object is further comprised of a line connecting at least two points specified with respect to the first and second fluoroscopic images.

16. (New) The method of claim 11, wherein the object is comprised of a non-linear line connecting at least two points specified with respect to the first and second fluoroscopic images.

17. (New) The method of claim 11, wherein the object is three-dimensional.

18. (New) The method claim 11, wherein the object represents a stent.

19. (New) A computer readable storage medium storing program instructions that, when read and executed by a computer, cause the computer to undertake the following:

displaying a first fluoroscopic image taken of an anatomical feature of interest from a first angle and a second fluoroscopic image taken from a second angle of the anatomical feature of interest, the first and second images being registered with respect to a common three-dimensional coordinate system;

defining in the three-dimensional coordinate system an object defined by at least two points by receiving indications of the position of the object with respect to the first and second fluoroscopic images;

displaying in the first and second fluoroscopic images a graphical representation of a projection of the object into the first and second fluoroscopic images; and

measuring a dimension of the object.

20. (New) The computer readable storage medium of claim 19, comprising additional program instructions that, when read, cause the computer to automatically update the positions of

the graphical representations of the object projected into the first and second fluoroscopic images based on a change in the position of the object.

21. (New) The computer readable storage medium of claim 19, comprising additional program instructions that, when read, cause the computer to automatically update the graphical representations of the object projected into the first and second fluoroscopic images based on a change to a parameter of the object.

22. (New) An apparatus for determining a dimension of an anatomical feature using two or more fluoroscopic images, comprising:

means displaying a first fluoroscopic image taken of an anatomical feature of interest from a first angle and a second fluoroscopic image taken from a second angle of the anatomical feature of interest, the first and second images being registered with respect to a common three-dimensional coordinate system;

means for defining in the three-dimensional coordinate system an object defined by at least two points by receiving indications of the position of the object with respect to the first and second fluoroscopic images;

means for displaying in the first and second fluoroscopic images a graphical representation of a projection of the object into the first and second fluoroscopic images; and

means for measuring a dimension of the object.

23. (New) The apparatus of claim 22, further comprising means for automatically updating the positions of the graphical representations of the object projected into the first and second fluoroscopic images based on a change in the position of the object.

24. (New) The apparatus of claim 22, further comprising means for automatically updating the graphical representations of the object projected into the first and second fluoroscopic images based on a change to a parameter of the object.

25. (New) Apparatus for determining the rate of velocity and/or acceleration of an object in a human body, comprising:

means for displaying a plurality of fluoroscopic images registered to a known frame of reference taken at successive time intervals;

means for receiving an indication with respect to the fluoroscopic images of a position of an object of interest in each of the images;

means for determining with respect to the frame of reference the position of the object at the success time intervals based on the indications of the position of the object on each of the plurality of fluoroscopic images; and

means for calculating a time derivative of the positions of the object.

26. (New) A computer readable storage medium storing program instructions that, when read and executed by a computer, cause the computer to undertake the following:

displaying a plurality of fluoroscopic images registered to a known frame of reference taken at successive time intervals;

receiving an indication with respect to the fluoroscopic images of a position of an object of interest in each of the images;

determining with respect to the frame of reference the position of the object at the success time intervals based on the indications of the position of the object on each of the plurality of fluoroscopic images; and

calculating a time derivative of the positions of the object.